Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

there seems no chance of the two kinds of time ever getting mixed up for they extend in opposite directions.

But wait—here's a disconcerting idea. If I roll up the paper I can make the future touch the past. I can overlap them. I can put A.D. into B.C. and what becomes of chronology then?

We are used to this curving of apparently straight lines in space ever since 1492 when men found that they were not living on a flat earth but on a sphere. If I travel straight east from this town I shall eventually come back to it from the west. How far I shall have to go depends upon where I live. If my home were on the equator, I should have to travel 25,000 miles to get to my starting point. If it were near one of the poles, I could do this astonishing stunt in the course of a morning's walk.

Now, according to Einstein, the time line is like the space lines. The framework of the world is measured by four dimensions, three of space and one of time, namely, the up-down, right-left, to-fro, past-future lines. But these are not rigidly fixed. They may be bent and distorted like a bird cage that has been twisted and crushed, though every wire remains intact and conn cted to the other wires just the same.

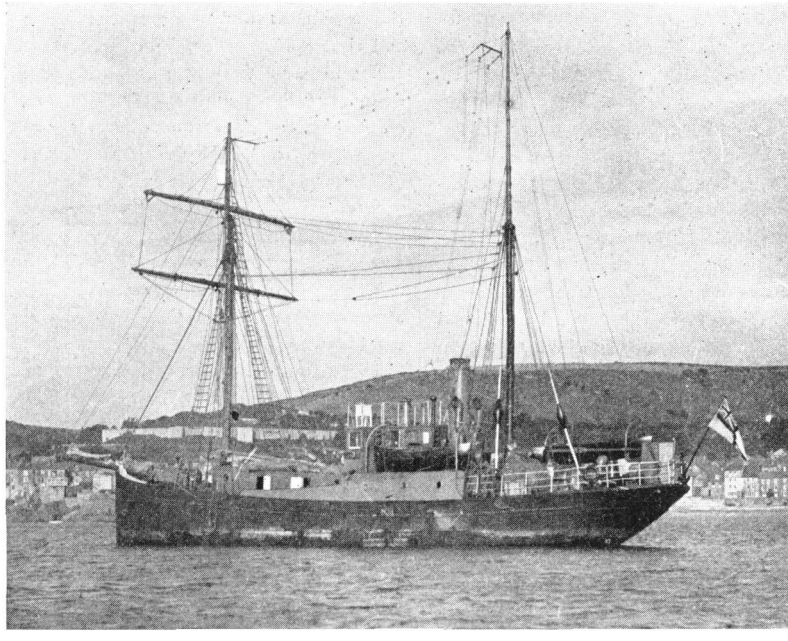
Wherever there is a bit of matter, wherever there are electrical or magnetic forces, there the time and space lines are more or less distorted. Einstein, reasoning from this idea, saw that a ray of light from a star, passing close by a heavy body like the sun, would not travel straight, but would be bent a little out of its course. The eclipse of 1919 brought the first chance to test Einstein's idea, and the astronomer royal of Great Britain went to Brazil and took a photograph of the shadowed sun and seven stars about it. And the seven stars seemed shoved out of their customary places just as if in the region around the sun the space and time were puckered up in the way Einstein said they were. When the eclipse of September 21, 1922, came, eight parties of astronomers were on the watch to see if the observations of three years before were confirmed.

We have not heard their verdict yet, but, if their photographs measure up according to Einstein formula we shall have to get accustomed to the idea that time—like the tariff—is a local issue; that time measurements like space measurements are relative, not absolute, and that we are not sure of the constancy of our standards of measure in either case. When two things happen in our presence we may be pretty sure which comes first. But if one event is here and another in Mars we can not be sure about priority with any conceivable system of clocks and signals. What seems past from one standpoint may seem future from another, for the time line may not run straight. Is your present condition in any way the result of your future actions? Can the light of a match be seen before the match is lit? Such a thing is conceivable in the generalized theory of relativity though, like most other conceivable things, it does not occur or is never known to occur in reality. But it is hard to get used to this strange new notion that the future may curl around in some sort of a circle and so come into the past.

Did I say "new"? It was a slip of the pen. For the idea is old. I open a volume of Egyptian antiquities and I see carved on a monument of the Pharaohs a serpent with its tail in its mouth, the symbol of eternity, of which time is a segment. But what the Egyptians merely guessed at Einstein is putting to the proof.

## HOW THE CHEMIST MOVES THE WORLD

THE chemist provides the motive power of the world, the world of man, not the inanimated globe.



*World Wide Photos*

THE *QUEST* AT PLYMOUTH

The *Quest*, the vessel of the Shackleton-Rowett Antarctic Expedition, on its arrival in Plymouth Harbor on September 16, after the expedition on which it embarked on September 17 of the previous year

Archimedes said he could move the world if he had a long enough lever. The chemist moves the world with molecules. The chemical reactions of the consumption of food and fuel furnish the energy for our muscles and machines. If the chemist can only get control of the electron, he will be in command of unlimited energy. For in this universe of ours power seems to be in inverse ratio to size and the minutest things are mightiest.

When we handle particles smaller than the atom, we can get behind the elements and may effect more marvelous transformations than ever. The smaller the building blocks, the greater the variety of buildings that can be constructed. The chemistry of the past was a kind of cooking. The chemistry of the future will be more like astronomy; but it will be a new and more useful sort of astronomy such as an astronomer might employ if he had the power to rearrange the solar system by annexing a new planet from some other system or expediting the condensation of a nebula a thousand times.

The chemist is not merely a manipulator of molecules; he is a manager of mankind. His discoveries and inventions, his economies and creations, often transform the conditions of ordinary life, alter the relations of national power and shift the currents of thought, but these revolutions are effected so quietly that the chemist does not get the credit for what he accomplishes, and indeed does not usually realize the extent of his sociological influence.

For instance, a great change that has come over the world in recent years, and has made conditions so unlike those existing in any previous period that historical precedents have no application to the present problems, is the rapid intercommunica-

tion of intelligence. Anything that anybody wants to say can be communicated to anybody who wants to hear it anywhere in all the wide world within a few minutes, or a few days, or at most a few months. In the agencies by which this is accomplished, rapid transit by ship, train or automobile, printing, photography, telegraph and telephone, wired or wireless, chemistry plays an essential part, although it is so unpretentious a part that it rarely receives recognition. For instance, the expansion of literature and the spread of enlightenment, which put an end to the Dark Ages, are ascribed to the invention of movable type by Gutenberg, or somebody else, at the end of the fourteenth century. But the credit belongs rather to the unknown chemist who invented the process of making paper. The ancient Romans stamped their bricks and lead pipes with type, but printing had to wait more than a thousand years for a supply of paper. Movable type is not the essential feature of printing, for most of the printing done now-a-days is not from movable type, but from solid lines or pages. We could if necessary do away with type and press altogether, and use some photographic method of composition and reproduction, but we could not do without paper. The invention of wood-pulp paper has done more for the expansion of literature than did the invention of rag paper 600 years ago.

Print is only an imperfect representation of the sound of speech, a particularly imperfect representation in the case of English because we can not tell how half the words sound from their spelling. But the phonograph gives us sounds directly, and the audion and the radio have extended the range of a speaker, until now a speaker may have an audi-

*World Wide Photos*

OFFICERS OF THE *QUEST*

After the death of Sir Ernest Shackelton, Commander Frank Wild succeeded him as leader of the expedition. He is shown second from the left. In the center is Commander Wilson. Mr. Wilding is shown on the right with the camera.

ence covering a continent and including generations yet unborn. What these inventions do for sound, photography has done for the sister sense of light. By means of them man is able to transcend the limitations of time and space. He can make himself seen and heard all round the earth and to all future years.

## SCIENTIFIC ITEMS

WE record with regret the death of Alexander Smith, formerly professor of chemistry at the University of Chicago and Columbia University; of Alice Robertson, formerly professor of zoology in Wellesley College; of David Sharp, formerly curator of the Museum of Zoology of the University of Cambridge and editor of the *Zoological Record;* of F. T. Trouton, emeritus professor of physics in the University of London, and of E. Bergmann, director of the Chemisch-Technische Reichsanstalt, Berlin.

SIR ERNEST RUTHERFORD, Cavendish professor of physics at the University of Cambridge, has been elected president of the British Association for the Advancement of Science in succession to Sir Charles S. Sherrington. The meeting next year will be at Liverpool; the following year the meeting will be in Toronto.

DR. ROBERT A. MILLIKAN, chairman of the board of the California Institute of Technology and director of the Norman Bridge laboratory of physics, has been appointed a member of the committee on intellectual cooperation of the League of Nations to succeed Dr. George E. Hale, director of the Mt. Wilson Observatory, who has resigned from the committee owing to the state of his health.

PROFESSOR W. L. BRAGG, of Manchester University, who, together with his father, Sir William Bragg, was awarded the Nobel Prize for physics in 1915, delivered on September 6 the lecture in Stockholm as prescribed by the statutes of the Nobel Institution.

THIS year's Silliman Memorial Lectures at Yale University will be delivered by Dr. August Krogh, professor of zoophysiology in Copenhagen University. Professor Krogh has taken for his general topic "The Anatomy and Physiology of Capillaries."